

VIII. *Descriptions of Aculeate Hymenoptera of Japan, collected by Mr. GEORGE LEWIS at Nagasaki and Hiogo.* By FREDERICK SMITH.

[Read 17th February, 1873.]

THIS collection is specially interesting, not only on account of its being the first, of any extent, that has been investigated and described, but also from the amount of interesting addition which it makes to the knowledge of geographical distribution of genera and species. The collection contained several additional species of *Andrenidæ*, but as the whole were sent in spirit, these pubescent insects were not in a condition desirable for description, the hair being matted together, and the original brightness of the colour evidently destroyed.

I received eighty species of *Aculeata*; of these, fifty-two I believe to be undescribed; the others, twenty-eight in number, are well-known species, described from specimens obtained from North China, India, Borneo, and islands in the Indian and Australian regions of the Archipelago. Only three insects are identical with species found in Europe, and two with species of North America.

On a future occasion I hope to publish descriptions of a number of *Tenthredinidæ* and *Ichneumonidæ*, and also some very interesting species of *Formicidæ*, received at the same time as the *Aculeata*.

The following list comprises the genera and the number of species of each described in the present paper:—

Mutilla	4 species	Trypoxylon	1 species	Osmia	1 species
Tiphia	5 "	Cerceris	1 "	Megachile	2 "
Scolia	5 "	Eumenes	2 "	Lithurgus	1 "
Pompilus	9 "	Rhynchium	2 "	Nomada	2 "
Priocnemis	3 "	Odynerus	2 "	Cœlioxys	1 "
Agania	1 "	Vespa	5 "	Stelis	1 "
Ammophila	1 "	Polybia	1 "	Crocisa	1 "
Pelopæus	3 "	Polistes	3 "	Eucera	1 "
Sphex	1 "	Prosopis	2 "	Anthophora	1 "
Ampulex	1 "	Sphecodes	1 "	Xylocopa	1 "
Larrada	5 "	Halictus	5 "	Bombus	3 "
Bembex	1 "	Nomia	1 "	Apis	1 "

*HETEROGYNA.**MUTILLIDÆ.*Genus *MUTILLA*, Linn.1. *Mutilla pustulata.*

Male. Length 5 lines. Black, with the two basal segments of the abdomen red. The head and thorax coarsely punctured, and having a thin, erect, black pubescence; that on the legs is cinereous; on each side of the face, below the insertion of the antennæ, is a line of snow-white pubescence; the wings fusco-hyaline, darkest towards their apex; the metathorax covered with large deep punctures. The apical margins of the third and fourth segments fringed with white pubescence.

Hab.—Hiogo.2. *Mutilla insidiator.*

Female. Length $3\frac{1}{2}$ lines. Head and abdomen black, thorax red. Head shagreened; thorax oblong and very strongly and closely punctured, the margin crenulated; the legs covered with fine, short, cinereous pubescence; the spines at the apex of the tibiæ white, and the apical joints of the tarsi obscure fusco-ferruginous. The abdomen covered with fine short black pubescence; a transverse spot of silvery-white pubescence on each side of the second segment placed rather forwards before the middle, a broad band of the same on the third segment, the fifth segment has a similar coloured fringe on its apical margin.

Hab.—Hiogo.3. *Mutilla ardescens.*

Female. Length 3 lines. Head and abdomen black, thorax and legs red. Head shagreened; tips of the mandibles, and the antennæ, ferruginous; the latter fuscous above, towards the apex. Thorax oblong, the sides nearly parallel, crenulated, and rugose-punctate; tips of the femora fuscous. Abdomen very closely and finely punctured. A small patch of pale golden pubescence in the middle of the basal segment, a band of the same on the apical margin of the second segment, and the apical segment covered with similar pubescence.

Hab.—Nagasaki.4. *Mutilla pungens.*

Female. Length 4 lines. Head and abdomen black, the thorax red. Head very closely punctured, the man-

dibles obscurely rufo-piceous. Thorax oblong-quadrate, the sides nearly parallel; the anterior margin more or less black; the sides of the thorax crenulate; the apical joints of the tarsi ferruginous. Abdomen with a thin, black pubescence, a golden spot at the base; the second segment with a fascia of similar coloured pubescence; the apical segment ferruginous; all the segments are fringed beneath with pale pubescence.

Hab.—Hiogo.

FOSSORES.

SCOLIIDÆ.

Genus *TIPHIA*, Fabr.

1. *Tiphia fuscipennis*.

Female. Length 6 lines. Jet black and shining; the anterior wings brown. The head evenly but not closely punctured; the antennæ stout, and of an opaque black. The prothorax and disk of the mesothorax with a few strong punctures, the posterior margin of the former rufo-piceous; the upper surface of the metathorax with three central elevated parallel lines extending from the base to the verge of the truncation; the latter opaque and pubescent; the sides of the metathorax obliquely striated; the legs with a glittering white pubescence, which is most dense on the tibiæ and tarsi; the spines at the apex of the tibiæ and tarsal joints pale testaceous. Abdomen punctured, the first and second segments finely and distantly so; the other segments more strongly and closely punctured; the apical margin of the terminal segment rufo-piceous.

Hab.—Hiogo.

2. *Tiphia punctata*.

Male. Length 4 lines. Jet black and shining; the anterior wings slightly fuscous, the posterior pair subhyaline. The head, prothorax and mesothorax rather strongly punctured; most closely so on the face; the antennæ opaque; the metathorax rugose, with three central sub-parallel elevated lines, which extend from the base to the apex of the truncation; the latter opaque and rugose. Abdomen: the basal segment with strong, deep, distant punctures; the second segment with fine distant punctures; those on the following segments closer and stronger.

Readily distinguished by the puncturing of the basal segment of the abdomen.

Hab.—Hiogo.

3. *Tiphia rufo-mandibulata*.

Female. Length $3\frac{3}{4}$ lines. Jet black and shining; the anterior wings fusco-hyaline, the posterior pair paler, the mandibles ferruginous. The head, prothorax and mesothorax, punctured; the superior surface of the metathorax with three longitudinal elevated lines, widest apart at the base; all extending to the verge of the truncation, the latter opaque and pubescent; the sides of the metathorax obliquely striated; the tegulae ferruginous; the spines at the apex of the tibiae and of the joints of the tarsi, pale rufo-testaceous. The abdomen with delicate distant punctures, most close on the four apical segments; the terminal segment ferruginous at the apex.

Hab.—Hiogo.

4. *Tiphia ordinaria*.

Male. Length $3\frac{3}{4}$ lines. Jet black, shining and pubescent; the head, prothorax and mesothorax evenly, but not very closely, punctured; the metathorax with three elevated central raised lines, the outer ones converging towards the verge of the truncation; the latter opaque and pubescent; the sides of the metathorax obliquely striated; the wings subhyaline; the tibial and tarsal spines pale testaceous; abdomen finely punctured, the two basal segments distantly so; the pubescence white and glittering and most dense towards the apex.

Hab.—Hiogo.

5. *Tiphia agilis*.

Male. Length 3 lines. Jet black, shining and finely punctured. The clypeus with silvery pubescence, the mandibles ferruginous, their base and apex black; the antennae fusco-ferruginous beneath, the scape black. The wings fusco-hyaline, the stigma black, the tegulae rufo-piceous; the superior surface of the metathorax with three central parallel raised lines; the anterior and intermediate tibiae and tarsi, pale rufo-testaceous; the extreme apex of the femora rufo-piceous. The abdomen pubescent towards the apex.

Hab.—Hiogo.

Genus SCOLIA, Fabr.

Div. (*Dielis*), Sauss.

Anterior wings with two submarginal cells and two recurrent nervures.

C — 1. *Scolia annulata*. *Elis*

Tiphia annulata, Fabr. Ent. Syst. ii. 225. *Scolia 4-fasciata*, Burm. Scol. 25, 27 ♀ only. *Scolia annulata*, Smith, Cat. Hym. Ins. iii. 100, 72. *Dielis annulata*, Sauss. and Sichel, Cat. Scol. 196, 210.

Hab.—India, Java, Phil. Isl. (Manilla), Celebes, China, Japan (Hiogo and Nagasaki).

C — 2. *Scolia grossa*. *Elis*

Tiphia grossa, Fabr. Syst. Piez. 232. *Scolia grossa*, Burm. Scol. 23, 22; Smith, Cat. Hym. Ins. iii. 99, 70. *Dielis grossa*, Sauss. and Sichel, Cat. Scol. 199, 215. *Elis sericea*, Mél. Hym. 63, 31, ♂.

Hab.—India, Java, Borneo, Sumatra, Aru, Japan (Hiogo and Nagasaki).

Div. (*Discolia*), Sauss.

Anterior wings with two submarginal cells and one recurrent nervure.

3. *Scolia fasciatus*. *Elis*

Male. Length 8 lines. Black, the abdomen splendidly iridescent, with blue, violet, and coppery brilliancy. The head and thorax closely and strongly punctured, the clypeus rugose. Thorax shining; the metathorax with two small patches of cinereous pubescence at its base; the wings fuscous, and having a coppery iridescence, the anterior pair darkest along the costal margin; the second segment has a small lunate orange spot in the middle of its outer margin.

Hab.—Hiogo.

4. *Scolia japonica*. *Elis*

Female. Length 9 lines. Black, shining and punctured; the first, and three following segments of the abdomen, with a large yellow macula on each side.

The head strongly punctured, the clypeus longitudinally rugose; the mandibles rufescent at their apex; the face thinly covered with pale fulvous hair. Thorax strongly punctured; the prothorax with a yellow line on each side, and being, as well as the metathorax, thinly covered with short pale fulvous pubescence; the wings fulvo-hyaline, the nervures ferruginous. Abdomen: the first segment has an oblong spot on each side, the second has a similar spot, which is hook-shaped at its inner extremity; the

third and fourth has a semicircular spot, the latter spots almost unite at their extremities within.

Male. Of the same length as the female; the head entirely black; a lateral line on the prothorax, and the scutellum and post-scutellum, yellow; wings as in the other sex. Abdomen: the first and second segments have an oblong spot on each side; the four following segments have a yellow band on their apical margin; that on the third segment is broad and slightly narrowed in the middle; the three following bands are each narrower in succession; beneath, immaculate.

Hab.—Hiogo.

5. *Scolia ventralis*.

Male. Length 7 lines. Black, shining, and with a bright iridescence on the abdomen, which is banded with yellow; thinly covered with hoary pubescence. The head entirely black; the posterior margin of the prothorax with a yellow line on each side; the wings fulvo-hyaline, the nervures fusco-ferruginous. Abdomen: the first and three following segments with a yellow fascia on their apical margins; the fasciæ are notched in the middle, and on each side are more or less emarginate; those on the first and second segments are subinterrupted in the middle. Beneath, the second, third, and fourth segments have on each side a minute, oblong, yellow spot.

Hab.—Hiogo.

POMPILIDÆ.

Genus POMPILUS, Fabr.

1. *Pompilus fragilis*.

Male. Length 3 lines. Black, shining and impunctate. The face, below the insertion of the antennæ, covered with silvery pubescence; the palpi pale testaceous. The posterior margin of the prothorax angular; the metathorax, sides of the thorax, beneath, and the legs, covered with a fine silky silvery pile; the wings hyaline, but with a fuscous cloud beyond the stigma; the nervures black. Abdomen subpetiolate, the basal margins of the segments covered with silky silvery pile.

Hab.—Hiogo.

2. *Pompilus maculifrons*.

Male. Length 6 lines. Black, smooth, slightly shining, and variegated with white lines and spots; the

wings subhyaline, with a dark cloud at their apical margins beyond the third submarginal cell. Head: a narrow line behind the eyes, a broader one at their inner margin on the face, not extending to their vertex; a bilobed spot between the antennæ, a triangular one on each side of the clypeus, and the mandibles, white, the latter ferruginous at their apex; the palpi pale ferruginous; the scape white in front, and the flagellum fulvous beneath. The anterior coxæ with a white spot at their apex; the tibiæ, tarsi and femora ferruginous in front, the latter black towards the base; the tibiæ with a white line outside; the intermediate and posterior femora ferruginous within; the posterior tibiæ pale at their base; all the calcaria pale; the intermediate and posterior femora ferruginous towards their apex; the posterior margin of the prothorax white, and a minute white spot on the mesothorax before the scutellum; the metathorax with a thin clothing of griseous pubescence. An interrupted white line at the basal margin of the second, third and fourth segments.

Hab.—Hakodadi.

3. *Pompilus arrogans*. ✓

Female. Length $6\frac{1}{2}$ lines. Black, the abdomen maculated with white. Head: an abbreviated narrow white line at the inner and outer orbits of the eyes; the anterior margin of the clypeus rounded. Thorax: the posterior margin of the prothorax rounded, and with a slightly interrupted white fascia; the wings subhyaline, and with a dark fuscous cloud at their apical margins beyond the third submarginal cell; the metathorax smooth and shining; a minute white spot at the base of the posterior tibiæ. Abdomen: a white elongate spot at the basal margin of the second and third segments laterally, the spots pointed within; all the tibiæ and tarsi spinose.

Hab.—Hiogo.

4. *Pompilus consanguineus*. ✓

Female. Length $6\frac{1}{2}$ lines. Black, smooth, and shining; the mandibles ferruginous towards their apex, with the tips black; the posterior margin of the prothorax angulated; wings fuscous, with a dark cloud at their apex; legs spinose; the sides of the abdomen thinly covered with whitish pile.

This species exactly resembles large examples of the European *P. niger* which I have received from Dumfries, and, like them, it has the third submarginal cell much less

contracted towards the marginal; in all other respects it exactly corresponds with British specimens of *P. niger*.

Hab.—Hiogo. ✓

5. *Pompilus bilunatus*.

Male. Length $8\frac{1}{2}$ lines. Black, with the wings fuscous, and two pale yellow, lunate, spots at the base of the third segment of the abdomen. Head: the anterior margin of the clypeus truncate; the mandibles ferruginous towards their apex, with the tips black; the flagellum incrassate, tapering to a point at the apex, and fulvous beneath; a very narrow yellow line behind the eyes, and a broader one at the inner orbits of the eyes, narrowest towards the clypeus. The posterior margin of the prothorax slightly angulated; the metathorax truncate, the truncation subrugose; the legs have the spines, spurs, and claws black; the entire insect has a changeable fulvous pile, observable only in certain lights.

Hab.—Hakodadi.

℄ — 6. *Pompilus atrox*. ✓

Pompilus atrox, Dahlb. Hym. Europ. i. 63; Cresson, Trans. Amer. Ent. Soc. i. 98, 31, ♂ ♀.

Hab.—Hakodadi, Hiogo, N. America.

℄ — 7. *Pompilus exortivus*. ✓

Female. Length 11—12- $\frac{1}{2}$ lines. Head and thorax yellow, abdomen black. Head reddish-yellow; antennae paler; the clypeus rounded at the sides, truncate in front; the mandibles black at their tips. Thorax: reddish-yellow; the prothorax paler; the mesothorax with a lateral, and an abbreviated central ferruginous stripe; the metathorax with a little yellow pubescence, and a transverse convex margin at its apex; the wings fulvo-flavous, with a narrowish, dark, defined, apical border; the coxæ, trochanters and basal portion of the femora black; the knees, tibiæ and tarsi reddish-yellow; the apical joint of the anterior tarsi, and the three apical joints of the other pairs, black. The basal margin of the second segment of the abdomen more or less yellow, the apical segment also yellow.

Hab.—Hiogo, Hakodadi, India, and North China.

8. *Pompilus Erebus*. ✓

Female. Length $5\frac{1}{2}$ lines. Black, with hyaline wings bordered with dark fuscous at their apical margins, the nervures black. Head: a narrow pale line behind the

eyes towards their summit, a similar abbreviated line at the inner orbits of the eyes, opposite the insertion of the antennæ; the anterior margin of the clypeus rounded, the edge narrowly recurved and shining. The posterior margin of the prothorax curved, and with a narrow interrupted pale line; the spines and calcaria black.

Var.—A white subovate spot on each side of the second segment, at its basal margin.

Hab.—Hiogo.

C— 9. *Pompilus reflexus*. ✓

Female. Length 4 lines. Black, with the base of the abdomen red. Head and thorax smooth and shining; the mandibles ferruginous at their apex; the anterior margin of the clypeus widely truncate, the angles of the truncation rounded; the posterior margin of the prothorax curved; the metathorax with a central longitudinal slightly impressed line; wings subhyaline, with a fuscous cloud at their apical margins. Abdomen: the base of the first segment black; the remainder, as well as the second segment, red; the entire insect smooth and shining.

Hab.—Hiogo.

Genus PRIOCNEMIS, Schiödde.

C— 1. *Priocnemis irritabilis*. ✓

Female. Length $7\frac{1}{4}$ lines. Black; wings hyaline, with a fuscous fascia. Head and thorax semi-opaque; the clypeus truncate anteriorly; the mandibles prominent, stout, and bidentate. The posterior margin of the prothorax angular; the nervures of the wings black; a fuscous fascia occupies the marginal cell, and crosses the anterior wings nearly to the bottom of the third discoidal cell. The abdomen smooth and shining, the apical segment having a little ferruginous pubescence at its apex.

Hab.—Hiogo.

2. *Priocnemis Atropos*. ✓ ✓

Female. Length $3\frac{3}{4}$. Black, head and thorax semi-opaque, abdomen shining, wings with a broad fuscous fascia. Head: the clypeus widely emarginate, and, as well as the antennæ, having a changeable cinereous pile; the posterior margin of the prothorax subangular; the wings hyaline, with a fuscous fascia occupying the marginal cell, and crossing the wing nearly to the bottom of the third discoidal cell: a narrower fascia

crosses the wing at the apex of the externo-medial cell; the posterior tibiæ strongly serrated externally. Abdomen very smooth and shining, with the apex slightly ferruginous.

Hab.—Hiogo.

This species very closely resembles the *P. variegatus* of Europe.

3. *Priocnemis dorsalis*.

Calicurgus dorsalis, St. Farg. Hym. iii. 407; Smith, Cat. Mutill. and Pomp. p. 146.

Hab.—Hakodadi, Hiogo, India.

Genus AGENIA, Schiödte.

1. *Agenia constructor*.

Female. Length 4 lines. Black; wings hyaline, with a dark fascia crossing the anterior pair at the marginal cell. Head: the clypeus with the anterior margin truncate; the palpi testaceous, the tips of the mandibles ferruginous; the apical joints of the antennæ fulvous beneath. The posterior margin of the prothorax subangulate; the metathorax transversely and finely rugose; the legs without spines; the calcaria black. Abdomen petiolated, smooth and shining; the entire insect with a fine griseous changeable pile, which is brightest on the coxæ and metathorax.

The male is smaller, has a broad white line on each side of the face running a little above the insertion of the antennæ; the anterior and intermediate coxæ are pale beneath, and the femora and tibiæ are pale fulvous beneath; the posterior legs black; the abdomen petiolated, and having the apical segment white; the insect covered with a fine cinereous pile.

Hab.—Hakodadi.

Although the wings have not a fascia, yet theiruration agrees with that of the female, and the general habit warrants my considering it the male of this species.

SPIEGIDÆ.

Genus AMMOPHILA, Kirby.

— 1. *Ammophila infesta*.

Female. Length 10—11 lines. Black, with the apex of the petiole, and the first segment, red. Head shining, and with a few shallow punctures; the clypeus has a slight short fulvous pubescence, and is sprinkled with

longer black hairs. The mesothorax with scattered punctures and a deep longitudinal central channel; the scutellum irregularly longitudinally striated; the metathorax with a transverse rugose striation above, the sides covered with short griseous pubescence; the wings subhyaline, the nervures nigro-piceous. The abdomen with a blue tinge in certain lights; the legs covered with hoary pile.

Male. This sex is more pubescent, and has the clypeus and sides of the face densely covered with silvery pile: the mesothorax is transversely coarsely rugulose; the petiole, and a line down the first segment of the abdomen, black.

Hab.—Hiogo.

Genus PELOPÆUS, Latr.

1. *Pelopæus Madraspatanus*, Fabr. Syst. Piez. 203; Dahlb. Hym. Europ. i. 22.

Hab.—Hiogo, Hakodadi, India, Celebes.

— 2. *Pelopæus Bengalensis*, Dahlb. Hym. Eur. i. 433.

Hab.—Hakodadi, Hiogo, China, Phil. Islands, Celebes, Borneo, Timor, India.

3. *Pelopæus deformis*, Smith, Cat. Sphegidæ, &c. 231.

Hab.—Hakodadi, Shanghai.

Genus SPHEX, Fabr.

— 1. *Sphex argentata*, Dahlb. Hym. Eur. i. 25. *Sphex argentifrons*, St. Farg. Hym. iii. 337.

Hab.—Hakodadi, Hiogo, India and Islands of the Archipelago, Africa and N. America.

Genus AMPULEX, Sauss. ✓

1. *Ampulex novaræ*, Sauss. Voy. Novar. Hymenop. p. 44, ♂.

Hab.—Hakodadi, Hongkong.

The female is coloured like the male, being entirely violaceous, with the posterior femora ferruginous; the head, viewed above, is quadrate; the clypeus smooth, and acutely carinate, terminating in three prominent teeth at its apex; it is shining and sparingly punctured, with the mandibles ferruginous at their apex. The prothorax smooth, compressed, with a longitudinal channel above, where it is slightly transversely strigose; the mesothorax

sparingly punctured on the disk, having two deeply impressed longitudinal lines; the metathorax transversely striated, and having one central, and on each side four longitudinal carinæ; the two nearest the central one, running obliquely inwards; a minute tooth at each of the posterior angles. The abdomen petiolate, elongate and compressed; acute at its apex. Wings hyaline, the nervures black.

LARRIDÆ.

Genus LARRADA, Smith.

— 1. *Larrada docilis*. ✓

Female. Length 6 lines. Black, slightly shining, wings subhyaline. Head: the vertex with a single ocellus placed in a smooth depression, above which are two small tubercles; the clypeus covered with silvery pile. Thorax: the prothorax and mesothorax impunctate; the metathorax abruptly truncate, and finely transversely strigose above; the tegulæ rufo-piceous; the wings fulvo-hyaline; the nervures ferruginous. Abdomen: the three basal segments have a glittering silvery pile on their apical margins, only observable in certain lights; the apical segment opaque, and ferruginous at its apex. The legs and sides of the thorax have a fine glittering cinereous pile.

Male. This sex only differs in having the mandibles and the scape in front pale ferruginous; the anterior tibiæ and all the tarsi, rufo-piceous.

Hab.—Hiogo, Hakodadi.

2. *Larrada nigricans*. ✓

Female. Length $3\frac{1}{4}$ lines. Black, wings subhyaline, the nervures black. Head finely shagreened, the face with silvery pubescence; the mandibles ferruginous towards their apex, with the tips black. Thorax shagreened, with the metathorax rugulose; the legs with fine cinereous pile, which is very bright and dense on the posterior tibiæ within; it is also very bright on the tarsi. Abdomen smooth and shining, with silvery fasciæ on the posterior margins of the segments, observable only in certain lights.

The male does not differ in any material respect from the female.

Hab.—Nagasaki. ✓

3. *Larrada Tisiphone*. ✓

Female. Length 6 lines. Black, the wings flavo-

hyaline; the nervures testaceous as well as the posterior margin of the tegulæ. Head opaque, with a fine silvery pubescence on the face; the cheeks have also a silvery pubescence. The thorax opaque, with the mesothorax only slightly shining and impunctate, depressed anteriorly and with two impressed lines extending to the disk; the metathorax transversely striated above; the sides of the truncation also striated in the same manner; the legs shining, and with a changeable silvery pile; the posterior tibiæ with some bright fulvous pubescent pile at their apex within. Abdomen smooth and shining, with changeable silvery fasciæ on the apical margins of the segments, only observable in certain lights; the apical segment opaque, except at its basal margin.

Hab.—Nagasaki.

4. *Larrada amplipennis*. ✓

Male. Length 6 lines. Black, with the two basal segments of the abdomen red. Head wider than the thorax; the face covered with silvery-white pubescence, mandibles shining and obscurely ferruginous at their tips. Thorax opaque, finely and very closely punctured; wings fuscous, the posterior pair hyaline at their base; the tegulæ obscurely testaceous; the nervures dark brown; the metathorax with a thin cinereous pubescence. Abdomen slightly shining and thinly covered with cinereous pubescence, observable in certain lights, as are also the bright silvery fasciæ on the apical margins of the segments.

Hab.—Hiogo.

5. *Larrada Erebus*. ✓

Female. Length $6\frac{1}{2}$ lines. Black, the wings subhyaline, the nervures dark fuscous. The head shining; a single ocellus situated in a deep frontal irregular depression; the scape robust and compressed; the anterior margin of the clypeus broadly angular; the mandibles dark ferruginous and fringed with ferruginous hairs; the cheeks with a thin cinereous pubescence. Thorax: opaque, and closely and finely punctured; the metathorax abruptly truncate and finely rugulose; transversely so above; the legs with a fine cinereous pile; the apical joint of the tarsi testaceous; the claws pale. Abdomen shining and impunctate.

Hab.—Hiogo.

BEMBICIDÆ.

✓ Genus BEMBEX, Fabr.

1. *Bembex Niponica*.

Male. Length $8\frac{1}{2}$ — $9\frac{1}{2}$ lines. Mesothorax black above; abdomen livid yellow, banded and spotted with black. Head yellow, with the vertex black, the black terminating on the face in a bifurcate shape, the forks continued down to the insertion of each antenna; black behind, with a yellow line running down to the base of the mandibles, their tips black; scape of the antennæ yellow in front, and the flagellum yellowish beneath. Thorax: a narrow line on the prothorax, a line over the tegulæ and passing along the apical margin of the scutellum; another across the post-scutellum, and a curved line from the insertion of the posterior wings, which extends to the verge of the truncation of the metathorax, the lateral margins of which are also yellow; the legs yellow; the coxæ black above, and sometimes a black line behind the posterior femora; wings hyaline, with ferruginous nervures. Abdomen livid yellow; the truncation of the base black, sometimes forming two black lobate shapes at the upper margin, at other times these lobes cross the segment and unite with a black fascia on the apical margin of the first segment; a black fascia at the base of the second segment, varying in width; the second segment with a black spot on each side, which unites occasionally with the black fascia; the apical margins of the following segments black; beneath, a large bilobate black shape on each segment; the second segment with a prominent tubercle, more or less developed in various specimens.

Hab.—Hiogo.

CRABRONIDÆ.

Genus TRYPOXYLON, Latr.

1. *Trypoxylon obsonator*. ✓

Female. Length 7 lines. Black, with the apex of the petiole, and two following segments of the abdomen, red. Head: the face and sinus of the eyes covered with bright silvery pubescence; the flagellum fulvous beneath; the mandibles ferruginous. Thorax smooth and shining; the metathorax with a longitudinal channel, which widens into a broad excavation towards the apex; the sides of the thorax, and also beneath, with long, thin, silvery-white

pubescence; the anterior tibiæ and the base of the intermediate and posterior pairs, and the anterior and intermediate tarsi, pale testaceous; the wings hyaline and iridescent; the tegulæ testaceous; the abdomen with a fine cinereous pile, observable in certain lights.

Male. Length 5 lines. Differs in having the antennæ entirely black, and the abdomen less red at the base.

Hab.—Hiogo.

PHILANTHIDÆ.

Genus *CERCERIS*, Latr. ✓

1. *Cerceris navitatis*.

Female. Length $5\frac{1}{4}$ lines. Black, with the legs ferruginous, variegated with yellow markings. The head, thorax and abdomen closely, evenly, and strongly punctured; with a triangular shape at the base of the metathorax, smooth and shining. Head: a broad oblong-quadrate spot on each side of the face; a minute one behind the eyes, and the base of the mandibles, yellow. Thorax: a minute spot on each side of the collar, and the tegulæ yellow; the wings subhyaline, with their apical portion clouded. The apical margins of the second, third and two following segments with a narrow yellow fascia; all more or less attenuated in the middle, one or more usually interrupted; abdomen smooth and shining beneath with the apical margins of the segments coarsely punctured.

Hab.—Hakodadi.

DIPLOPTERA.

EUMENIDÆ, Westw.

Genus *EUMENES*, Fabr. ✓

1. *Eumenes fraterna*.

Female. Length 6 lines. Extremely like the *E. coarctata* of Europe. Black, with the clypeus longer than in "*coarctata*," notched at the apex, forming two teeth, a transverse yellow spot at the base; a minute yellow kite-shaped spot between the antennæ, which have their scape yellow in front. Thorax: the anterior margin of the prothorax narrowly yellow; a small, oblong spot beneath the wings; the margin of the tegulæ, the post-scutellum, and a small ovate spot on each side of the

metathorax, yellow; the tibiæ, tarsi and apex of the femora reddish-yellow; wings subhyaline. Abdomen: the apical margin of the petiolated basal segment, the apical margin of the second segment, the middle of the margin of the two following segments, more or less yellow; a small transverse yellow spot on each side of the second segment.

Hab.—Hiogo.

This species closely resembles both *E. coarctata* and *E. punctata* of Saussure. It differs from the former in having the clypeus longer; in having the yellow bands on the abdomen narrow, and of the same width throughout; the abdomen is also much more strongly punctured. From the latter it is at once distinguished by the shorter and much wider petiolated segment of the abdomen.

2. *Eumenes Lewisii*. ✓

Eumenes Lewisii, Sauss. Guêpes Sol. (MS.)

Hab.—Hiogo and Nagasaki.

Genus RHYNCHIUM, Spin. ✓

1. *Rhynchium ardens*.

Female. Length 6—8 lines. Black, spotted and banded with yellow. Head: the clypeus, scape in front, a minute spot between the antennæ, and another behind the eyes, yellow. Thorax: the prothorax above nearly to the base of the wings, a spot beneath them, the hinder margin of the tegulæ, a small curved line behind them, the scutellum and post-scutellum (except their basal margin) yellow; the tibiæ, tarsi and apical portion of the femora, reddish-yellow; the tegulæ fuscous; the wings fusco-hyaline. Abdomen: the posterior margins of the first, second and third segments above, yellow. The head and thorax very closely and strongly punctured; the abdomen shining and more finely punctured.

Hab.—Nagasaki.

This species closely resembles *R. flavo-punctatum* from N. China, and differs principally in having the clypeus longer, the basal segment of the abdomen shorter and broader, and its punctuation more close and finer.

2. *Rhynchium hæmorrhoidale*, Fabr. Ent. Syst. ii. 263. ✓

Hab.—Hiogo, India, Borneo, Malacca, Singapore, Celebes, Ceram, New Guinea, Africa.

Genus ODYNERUS, Latr.

1. *Odynerus captivus*. ✓

Female. Length 6 lines. Black, with three yellow bands on the abdomen. Head: a lunate yellow mark at the base of the clypeus, which is sparingly punctured and bidentate at its apex. Thorax: the mesothorax with two longitudinal impressed lines, which extend to the scutellum; there is also an abbreviated line over the tegulæ; the central division between the impressed lines strongly punctured; the lateral divisions very sparingly punctured; wings subhyaline, the nervures black; the scutellum and post-scutellum strongly punctured. Abdomen subpetiolate, much narrower than the second segment, and having a central impressed line; the first segment and the base of the second closely punctured, the rest of the abdomen smooth and shining; the apical margin of the first and second segments with a pale yellow fascia, the fourth with an abbreviated fascia.

Hab.—Hiogo.

This species belongs to Wesmael's genus *Symmorphus*.

2. *Odynerus Lewisii*, Sauss. Guêpes Sol. (MS.).

Hab.—Hiogo, Hakodadi.

VESPIDÆ.

Genus VESPA, Linn.

- 1. *Vespa mandarinia*, Smith, Trans. Ent. Soc. Lond. New Ser. ii. 38, tab. viii. fig. 1, ♀; Sauss. Mon. Guêpes Soc. 150.

Vespa japonica, Radaschkovski, Etudes Entom. Motsch. (1857), 40.

Hab.—Hakodadi, Hiogo, North China.

- 2. *Vespa ducalis*, Smith, Trans. Ent. Soc. Lond. New Ser. ii. 39, ♂, ♀, ♀; Sauss. Mon. Guêpes Soc. 151.

Hab.—Hiogo, Hong Kong, Shanghai.

- 3. *Vespa auraria*, Smith, Trans. Ent. Soc. Lond. New Ser. ii. 46, tab. viii. fig. 8; Sauss. Mon. Guêpes Soc. 147.

Vespa simillima, Smith, Entom. Month. Mag. iv. (1867-8), 280, ♂ var.

Hab.—Hakodadi, Hiogo, N. India.

4. *Vespa japonica*, Smith, Entom. Month. Mag. iv.
279, ♂.

Hab.—Hakodadi, Hiogo.

At the time that I described this species I was not aware that the name had been used by another Entomologist; but as the species to which, in the first instance, the name "*japonica*" was given, proves to be my own *V. mandarinia*, described five years previously, it is not necessary to alter the name. Since describing *V. japonica* ♂, I have received numerous workers, which are coloured similar to the male, but are rather smaller in size.

5. *Vespa Lewisii*, Sauss. Guêpes Soc. (MS.).

Genus POLYBIA, Sauss.

1. *Polybia orientalis*, Sauss. Mon. Guêpes Soc. 208,
tab. xxvi. fig. 2.

Hab.—Hakodadi, Hiogo.

Genus POLISTES, Latr.

1. *Polistes Chinensis*, Fabr. Syst. Piez. 270; Sauss. Mon. Guêpes Soc. 56, tab. vii. fig. 2; Voy. Novar. Hym. 19.

Hab.—Hakodadi, Hiogo, Shanghai, Hong Kong, Siberia.

This insect is not, in my opinion, specifically separable from *P. biglumis*, (*diadema*) of Europe.

2. *Polistes hebraeus*, Fabr. Syst. Piez. 273; Sauss. Mon. Guêpes Soc. 53.

Hab.—Hakodadi, Hiogo, India, China, Mauritius, Persia.

The Japanese, and also the Chinese form of this species, differ greatly in colouration from any we have seen from India. The thorax is black beneath; the mesothorax black, with two longitudinal yellow lines; the metathorax is usually black, but occasionally has two yellow lines; the abdomen is black, and beautifully variegated with yellow spots and lines; but the palest coloured examples from Japan very closely resemble the darker ones from India.

3. *Polistes Novaræ*, Sauss. Reise Novar. Hym. p. 19,
tab. i. figs. 13, 14, ♀.

Hab.—Hakodadi, Hiogo, Tellangchong (Nicobar Islands), Sambelong Island (Malacca Straits).

The specimens from Hiogo, and also those from Hakodadi, differ from the type of Saussure, and all the varieties he enumerates, in wanting the dark maculæ on the anterior wings; but that author considers them all specifically the same.

ANTHOPHILA.

ANDRENIDÆ.

Genus PROSOPIS, Fab.

1. *Prosopis floralis*. ✓

Female. Length 3 lines. Black: head and thorax closely punctured; abdomen smooth and shining. Head: a triangular spot on each side of the face, and a longitudinal stripe down the clypeus, pale yellow; the flagellum ferruginous beneath. Thorax: a narrow line on the collar, the tubercles and a spot on the tegulæ in front, pale yellow; the anterior tibiæ in front, and the extreme base of the intermediate pair, ferruginous; the base of the posterior tibiæ pale yellow; wings hyaline, their nervures black. The apical margins of the segments of the abdomen narrowly testaceous.

The male is rather smaller; has the face white, as well as the lower half of the scape of the antennæ, which is short and dilated; the anterior tibiæ, the base of rest, and the tarsi, very pale yellow.

Hab.—Hiogo.

2. *Prosopis perforata*. ✓

Female. Length 3 lines. Very like "*floralis*," but differing in having the head longer, the clypeus with the anterior margin pale, and without the central stripe; the collar with a pale interrupted fascia; the base of the metathorax coarsely rugose; the truncation abrupt, and with its margins somewhat raised; the extreme base of the anterior and intermediate tibiæ pale; one-third of the basal portion of the posterior tibiæ yellowish-white.

Hab.—Hakodadi.

Genus SPHECODES, Latr. ✓

1. *Sphcodes simillimus*.

Female. Length $3\frac{1}{3}$ lines. In colouring as well as in puncturing this insect exactly corresponds with the

S. rufescens of Europe ; the only difference observable is, that the antennæ appear to be proportionately longer and more slender.

Hab.—Hiogo.

I have two specimens for examination.

Genus HALICTUS, Latr. ✓

1. *Halictus occidentalis*.

Female. Length $4\frac{2}{3}$ lines. Black : head and thorax opaque and closely punctured ; abdomen delicately punctured, smooth and shining. Clypeus produced and truncate at the apex, which is fringed with ferruginous hairs ; the face with a thin pale-fulvous pubescence. Thorax with a thin, sparse, fulvous pubescence ; the post-scutellum with dense, short, fulvous pubescence ; the tibiæ and tarsi covered with a glittering golden pubescence, particularly dense on the posterior tibiæ within ; the tarsi obscure ferruginous ; wings sub-hyaline ; the tegulæ and costal nervure black, the rest of the nervures testaceous. The abdomen has the base of the second, third and fourth segments with a fascia of short whitish pubescence.

Hab.—Hiogo.

2. *Halictus scitulus*. ✓

Female. Length $3\frac{1}{4}$ lines. Black : head and thorax closely punctured ; the clypeus produced ; the face covered with thin cinereous pubescence ; that on the thorax above is pale fulvous, at the sides and beneath is paler ; the wings clear hyaline, the nervures pale testaceous ; the tarsi testaceous, and, as well as the tibiæ, covered with short, dense, pale-golden pubescence. Abdomen smooth and shining ; the basal margins of the first, second and third segments with a dense fascia of short whitish pubescence ; the apical segment with fulvous pubescence.

Hab.—Hakodadi.

3. *Halictus subopacus*. ✓

Halictus subopacus, Smith, Cat. Hym. Ins. Andrenidæ and Apidæ, 61, 86.

Two females received from Hakodadi ; not distinguishable from the *H. opacus* from N. China.

4. *Halictus tarsatus*. ✓

Male. Length $2\frac{1}{2}$ lines. The face covered with short white pubescence; the anterior margin of the clypeus and the mandibles pale testaceous; the flagellum fulvous beneath; head rounded, the clypeus scarcely produced. The tegulæ pale testaceous; legs rufo-testaceous, with all the tarsi, the anterior tibiæ, and extreme base of the intermediate and posterior pairs, pale yellow; wings hyaline and iridescent, the nervures testaceous. Abdomen smooth and shining, with the apical margins of the segments testaceous.

Hab.—Hiogo.

5. *Halictus ærarius*. ✓

Male. Length 3 lines. Bright brass-coloured. The clypeus produced; its apical margin, the mandibles and the flagellum beneath, excepting the two apical joints, yellow. The legs yellow; the tegulæ testaceous; the wings hyaline, the nervures testaceous; the margins of the segments of the abdomen depressed, and thinly fringed with short pale hairs.

Hab.—Hiogo.

This species closely resembles *Halictus tumulorum* of Europe.

Genus *NOMIA*, Latr. ✓

1. *Nomia japonica*. ✓

Length 7 lines. Black: punctured, the abdomen most finely so; the face with a griseous pubescence, on the vertex and thorax it is fulvous; that on the legs is also fulvous; the claw-joint of the tarsi ferruginous; the wings subhyaline, the nervures dark fuscous; a pale testaceous spot on the tegulæ. Abdomen: the apical margins of the segments are marginate and deeply depressed; the basal margins are also depressed, and have a fine, short, pale, downy pubescence; that on the apical segment is black; beneath, the colour is obscurely piceous, and the margins of the segments are fringed with pale hairs.

APIDÆ.

(Div. DASYGASTRÆ.)

Genus *OSMIA*, Panz. ✓

1. *Osmia Taurus*. ✓

Female. Length $5\frac{1}{2}$ lines. Obscure æneous: the head with long fulvous pubescence, inclining to fuscous on the

vertex; the clypeus with two stout horns, which are obliquely truncate at their apex; the mandibles very stout, and terminated by a strong bifid tooth. The thorax and legs with long pale fulvous pubescence, that on the tarsi ferruginous; the claw-joints ferruginous; the wings fusco-hyaline. Abdomen very convex, with a thin fulvous pubescence, and densely clothed beneath with ferruginous pubescence.

Male. Rather smaller than the female; the face with white pubescence; the tarsi have the claw-joint ferruginous; the abdomen black, with the apical margins of the segments testaceous.

Hab.—Hiogo.

Genus MEGACHILE, Latr. ✓

1. *Apis disjuncta*, Fabr. Ent. Syst. ii. 328. *Anthophora disjuncta*, Fabr. Syst. Piez. 374. *Megachile disjuncta*, St. Farg. Hym. ii. 331.

Hab.—India, Mauritius, Hakodadi.

— 2. *Megachile monticola*, Smith, Cat. Hym. Ins. ✓
Apidæ, 179, ♀.

Hab.—N. China, Silhet, Hakodadi, Hiogo.

Genus LITHURGUS, Latr. ✓

1. *Lithurgus collaris*.

Male. Length $5\frac{3}{4}$ lines. Black: the face covered with cinereous pubescence. Thorax: the collar with cinereous pubescence; beneath it inclines to fulvous, on the disk it is short and black; the legs shining black, with the posterior femora incrassate; the tibiae are also stout, and, as well as the first joint of the tarsi, are fringed with short black pubescence; wings slightly fuscous, their nervures black. Abdomen shining, flattened above, with the posterior margins of the segments narrowly fringed with short white pubescence, more or less interrupted in the middle; beneath with black pubescence, and the margins of the segments with a cinereous fringe.

Hab.—Hakodadi.

This species closely resembles *L. dentipes* of India, but that insect has the thorax of the female rugose anteriorly.

(Div. CUCULINÆ.)

Genus NOMADA, Fabr. ✓

1. *Nomada japonica*.

Female. Length $5\frac{1}{4}$ lines. Head and thorax black and closely punctured; the clypeus, a spot above it, and the orbits of the eyes, very narrowly, reddish-yellow; a minute black spot on each side of the clypeus; the antennæ and legs ferruginous; the coxæ and femora with a black line above; the apex of the tibiæ yellow above; the collar (narrowly), the tegulæ and scutellum, ferruginous; the wings flavo-hyaline, their apical margins clouded, the nervures ferruginous. Abdomen: the base and the apical margins of the first and second segments black; the intermediate space of the first segment ferruginous; the second and following segments have a yellow transverse fascia, the margins of the segments being obscure ferruginous; the second segment has a dark triangular spot in the middle of its basal margin.

Hab.—Hiogo.

2. *Nomada fervens*. ✓

Female. Length $4\frac{1}{2}$ lines. Ferruginous: two lines on the clypeus; the face, with a space above the insertion of the antennæ, and the middle of the vertex, black; the antennæ more or less fuscous above towards the apex. The mesothorax with three elongate stripes and the metathorax black; two ferruginous spots on the inclosed space below the post-scutellum, and two lines of the same below the space; wings fusco-hyaline; a clear hyaline spot beyond the third submarginal cell. Abdomen: the base and the apical margins of the segments narrowly edged with black; a quadrate yellow spot on the apical segment.

Hab.—Hiogo.

Genus CÆLIOXYS, Latr. ✓

1. *Cælioxys fenestrata*.

Female. Length $7\frac{1}{2}$ lines. Black: head and thorax coarsely rugose; the first, second and third segments of the abdomen evenly and rather strongly punctured; the two following segments very finely punctured at the base, and more strongly so towards their apical margins; the sixth segment elongated and acute, the inferior plate of the segment prolonged a little beyond the upper one; on

each side of the scutellum is a short tooth which is curved downwards. The face densely clothed with short bright fulvous pubescence; the wings dark fuscous, with their base hyaline. The apical margins of the segments of the abdomen are very narrowly fringed with white pubescence.

Hab.—Hakodadi, N. China.

Genus STELIS, Panz.

1. *Stelis abdominalis*, Smith, Proc. Linn. Soc. iv. 7, ♂.

Hab.—Hakodadi, Celebes, Java, Batchian.

Genus CROCISA.

1. *Nomada histrio*, Fabr. Ent. Syst. ii. 345. *Crocisa histrio*, Latr. Gen. Crust. et Ins. iv. 172.

Hab.—India, Algeria, Japan (Hiogo), Europe.

(Div. SCOPULIPEDES.)

Genus EUCERA, Scop.

— 1. *Eucera sociabilis*.

Female. Length 6 lines. Black: the thorax and base of the abdomen with long pale fulvous pubescence, that on the face is nearly white; the wings hyaline, with a faint cloud at their apical margins, the nervures fusco-ferruginous, the tegulae testaceous; the tibiae and tarsi have a fulvous pubescence; the basal joint of the intermediate and posterior pairs have ferruginous pubescence within; the spines at the apex of the tibiae are pale testaceous; the tarsi ferruginous. Abdomen: the second, third and fourth segments have a broad fascia of fine white pubescence on their apical margins, the two first usually widely interrupted; the fascia on the fifth segment is fulvous.

Male 4 lines. The antennae as long as the insect; the pubescence on the head and thorax paler than in the female, the tarsi ferruginous; abdomen without fasciae, with the margins of the segments testaceous; the clypeus yellow.

Hab.—Hiogo, N. China, Siberia.

Genus ANTHOPHORA, Latr.

1. *Apis nidulans*, Fabr. Ent. Syst. ii. 330, and *Centris nidulans*, Syst. Picz. 357.

Anthophora nidulans, St. Farg. Hym. ii. 27.

This species has a very wide geographical range, and, although not yet found in this country, is common in

France, Italy, Albania, Tunis, Algeria, Madeira, Canary Islands.

The specimens from Japan I have carefully examined, and cannot separate them from *A. nidulans*.

Genus Xylocopa, Latr.

— 1. *Xylocopa circumvolans*. ✓

Female. Length $10\frac{1}{2}$ lines. Shining black: the head strongly punctured, most closely so on the face; the clypeus with a central smooth line down the middle; the face has, at the insertion of the antennæ, and at the anterior margin of the clypeus, some short black pubescence. The thorax clothed above with pale fulvous pubescence; on the sides, legs, and also beneath, it is black; wings dark brown, with blue and violet iridescence in certain lights. Abdomen punctured, most closely so towards its apex.

Male. The same size as the female, and clothed with pubescence of the same colour; the clypeus, a triangular spot above it, and the scape beneath, yellow; also a yellow spot at the base of the mandibles; the posterior tibiæ incrassate, and tuberculate beneath, eyes large and more approximating than in the female, but not very closely so.

Hab.—Hiogo.

(Div. SOCIALES.)

Genus BOMBUS, Fabr.

1. *Bombus speciosus*. ✓

Female. Length 10 lines. Black: the face and the vertex clothed with yellow pubescence. The thorax clothed with yellow pubescence, and with a black band between the wings; the wings subhyaline, and having a fuscous cloud beyond the cells; the apical joints of the tarsi ferruginous, the claws black. Abdomen: the two basal segments clothed with yellow pubescence, the third with black, and the rest with bright ferruginous; beneath, the entire pubescence is yellow.

Hab.—Hiogo.

This species was taken at an elevation of 4,000 feet, but only a single specimen; it resembles *Bombus trifasciatus* from North China; which differs from it in having the head elongate, and its pubescence black; the abdomen beneath and the legs have also black pubescence.

2. *Bombus terminalis.* ✓

Worker. Length 9 lines. Black: the head elongate and with black pubescence; that on the legs, on the body beneath, on the sides of the third segment of the abdomen above, and the fourth, fifth, and sixth also, black; the clypeus very shining and sparingly punctured; the apical joints of the tarsi ferruginous, the claws black.

Hab.—Hiogo.

Taken at an elevation of 4,000 feet; six specimens. I have supposed them to be workers; they may, however, prove to be females.

✓
3. *Bombus ignitus.*

Female. Length 10 lines. Black, and clothed with black pubescence, except the three apical segments of the abdomen, which are covered with red hairs; the wings fusco-hyaline, darkest beyond the submarginal cells; the tarsi rufo-piceous, except the basal joint, and clothed beneath with ferruginous hair.

Hab.—Hakodadi.

Of this species I have only received one sex, the female; it is larger, but very like the *B. lapidarius* of Europe, but it most closely resembles *B. similis* of N. China; the latter species is still larger, and has dark-fusces wings; probably the males of each, if compared, would offer good differential specific characters.

✓
Genus *APIS*, Linn.

1. *Apis nigro-cincta*, Smith, Proc. Linn. Soc. v. 93, 8.

The queen of this species, which I have received from Mr. Lewis, is smaller than that of *A. mellifica*, being about two-thirds of its size; it is so like that species that a comparison of the two is necessary in order to detect any difference, but the posterior legs are proportionately broader, and the tarsal joints also differ slightly in form. It has none of the bright-red colouring of the worker. Mr. Lewis found it dead near to a hive of "*nigro-cincta*," and he informs me that he has not observed the *Apis mellifica* in Japan.